

HLM-2000-TX

Gas Transmitter

User Manual

Technical Support

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WARRANTY

The HLM-2000-TX transmitters are warranted against defects in material and workmanship for a period of two years from date of delivery (for sensor, see 1.1.1 Sensor / Transmitter Specifications). During the warranty period, Arjay Engineering will repair or replace components that prove to be defective in the opinion of Arjay. We are not liable for auxiliary interfaced equipment, or consequential damage. This warranty shall not apply to any product, which has been modified in any way, which has been repaired by any other party other than a qualified technician or authorized Arjay representative, or when such failure is due to misuse or conditions of use.

LIABILITY

All Arjay products must be installed and maintained according to instructions. Only qualified technicians should install and maintain the equipment.

Arjay shall have no liability arising from auxiliary interfaced equipment, for consequential damage, or the installation and operation of this equipment. Arjay shall have no liability for labour or freight costs, or any other costs or charges in excess of the amount of the invoice for the products.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, AND SPECIFICALLY THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THERE ARE NO WARRANTIES THAT EXTEND BEYOND THE DESCRIPTION ON THE FACE THEREOF.

MODIFICATIONS AND SUBSTITUTIONS

Due to an ongoing development program, Arjay reserves the right to substitute components and change specifications at any time without incurring any obligations.

PRODUCT RETURN

All products returned for warranty service will be by prepaid freight and they will only be accepted with an R.M.A number issued by Arjay. All products returned to the client will be freight collect.

WARNING

USING ELECTRICALLY OPERATED EQUIPMENT NEAR GASOLINE, OR GASOLINE VAPOURS MAY RESULT IN FIRE OR EXPLOSION, CAUSING PERSONAL INJURY AND PROPERTY DAMAGE. CHECK TO ASSURE THE WORKING AREA IS FREE FROM SUCH HAZARDS, AND USE PROPER PRECAUTIONS.

PRODUCT INFORMATION

Sensor/Transmitter

Sensor/Transmitter Unit Order Number	_____
Transmitter Part Number	_____
Transmitter Serial Number	_____
Sensor Part Number	_____
Sensor Serial Number	_____
Power Supply Requirement	12 to 30 VDC @ 20 mA
Sensor Warranty	_____

Factory Calibration

Gas Type	_____
Zero Gas, at 4 mA Signal	_____
Gas Concentration at 20 mA Signal	_____

NOTE:

ALL ARJAY MONITORING SYSTEMS MUST BE INSTALLED AND MAINTAINED ACCORDING TO INSTRUCTIONS, TO ENSURE PROPER OPERATION. ONLY QUALIFIED TECHNICIANS SHOULD INSTALL AND MAINTAIN THE EQUIPMENT.
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1 PRODUCT DESCRIPTION

In this section, a general product description of the HLM-2000-TX unit is given followed by sensor specification listings and various enclosure housing options

1.1 GENERAL DESCRIPTION

The HLM-2000-TX sensor/transmitter unit is designed to provide continuous, reliable surveillance of surrounding air for traces of a specific hazardous gas (es) listed in the Factory Calibration section on page vi. This unit provides a 4 to 20 mA variable current signal which is proportional to the gas concentration detected. Each sensor/transmitter unit is factory calibrated and is ready for field installation and operation.

1.1.1 Sensor / Transmitter Specifications

Sensor Type	Electrochemical cell
Response Time	Better than ____% step change in ____ seconds
Drift	Less than ____% of full scale per ____
Sensor Signal Output	_____ Linear to the concentration of gas
Operating Temperature Range	_____ °C to _____ °C (_____ °F to _____ °F)
Humidity	_____ % to _____ % RH, non-condensing
Expected Sensor Life	Greater than ____ year(s)

Note: **TURN OFF POWER SUPPLY BEFORE REMOVING OR REPLACING THE TRANSMITTER OR SENSOR.**

1.1.2 Housing Options

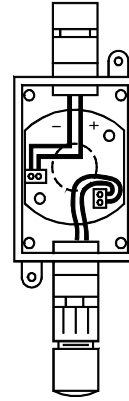
The HLM-2000-TX sensor/transmitter units are available in the housings shown in Figure 1.1 – “Transmitter Housing Options”. The explosion proof transmitter housing has a corrosion resistant finish and is rated explosion proof for Class 1, Groups B, C, D locations. The sensors are also available as standard or explosion proof.

PVC HOUSING:

Rectangular PVC with cover plate held by four screws. Not for use in combustible areas and not weather proof.

PVC HOUSING:

Width: 2.9"
Height: 2.25"
Length: 6"
Hub Size: ¾" NPT

**EXPLOSION PROOF HOUSING:**

Round housings with screw-on covers. Weatherproof and explosion proof. (see rating listed in section 0)

B C D HOUSING

Width: 4.9"
Height: 4.7"
Length: 4.8"
Hub Size: ¾" NPT

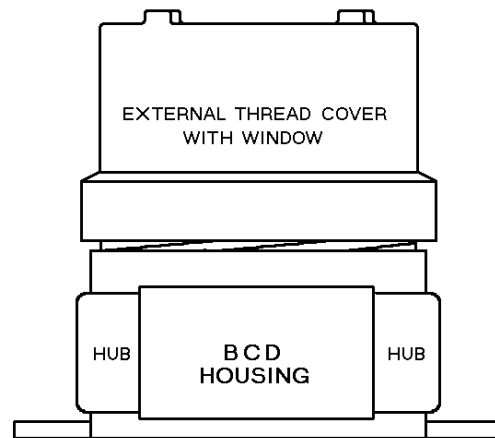


Figure 1.1 – “Transmitter Housing Options”

2 INSTALLATION

This section discusses topics relating to the proper installation of the HLM-2000-TX unit.

2.1 LOCATION AND MOUNTING

Mount the sensor/transmitter unit on a solid, non-vibrating surface or structure in an area where the local concentration of gas is unaffected by the presence of ventilation systems and away from sources of interference gases.

NOTE:

MOUNTING ARRANGEMENT OF THE HOUSING DEPENDS ON LOCATION AND MOUNTING SURFACE. MOUNTING HARDWARE IS NOT SUPPLIED.

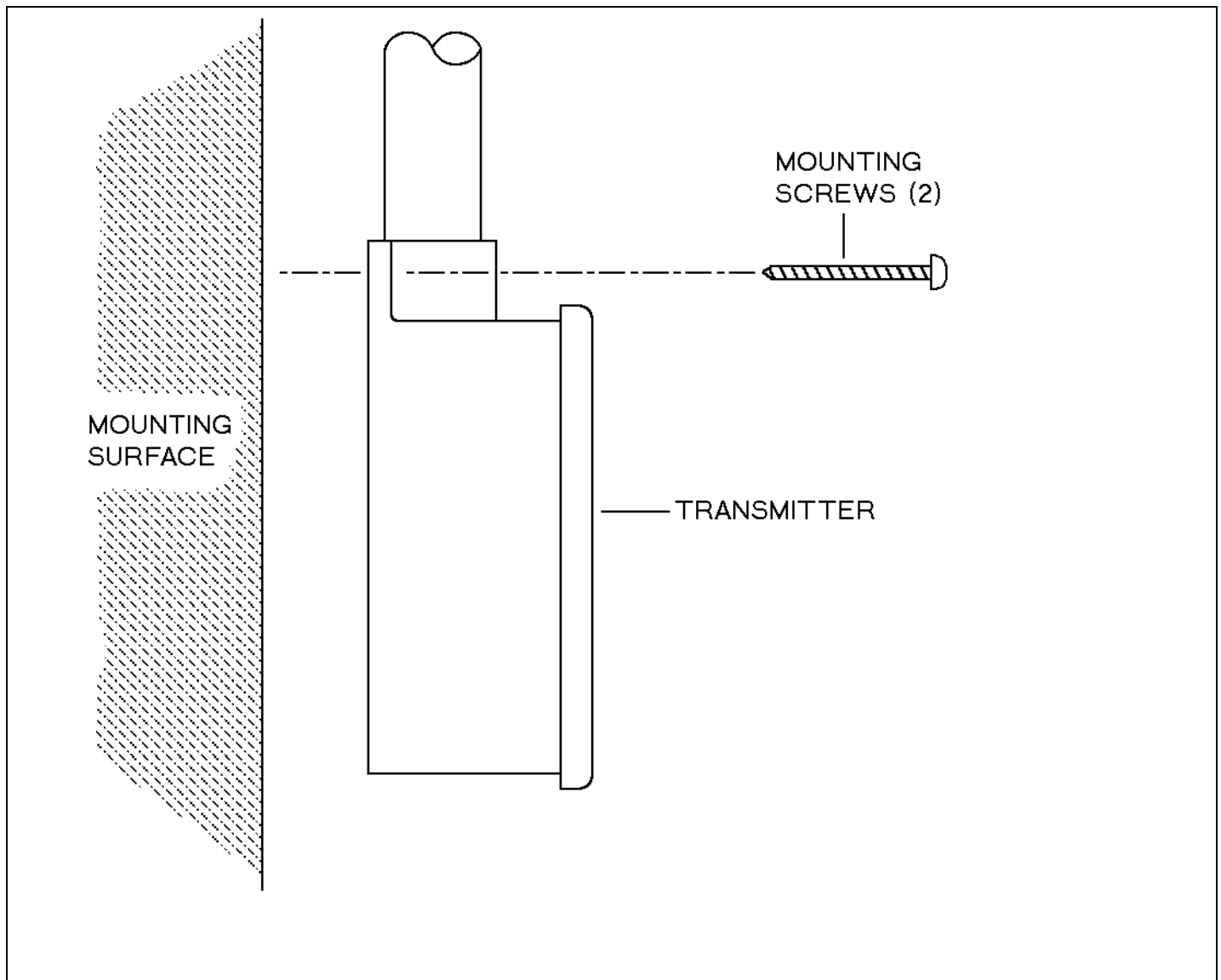


Figure 2.1 - "Mounting the Sensor/Transmitter Unit"

2.2 CABLE SELECTION AND WIRING

Connection should be made using 2-conductor, shielded cable. For best signal transmission and maximum noise rejection, run the cable through steel conduit (cable must be grounded at the monitor or power supply). Supply voltage can be measured at the transmitter (-,+) connections at the supply source. For basic cable selection between the source and transmitter, using a 250 ohm load resistance, use Table 0-1 - "Cable Selection Guide".

Table 0-1 - "Cable Selection Guide"

WIRE GAUGE	AWG	22	20	18	16
MAXIMUM DISTANCE IN FEET AND (metres)	@12 VDC	1000 (305)	1500 (457)	2500 (762)	3800 (1158)
	@ 24 VDC	15000 (4572)	23000 (7010)	38000 (11582)	57000 (17373)

For applications not covered by the above chart, an example is shown below for selecting the right cable, using the graph in Figure 2.2 - "Cable Selection Graph" and the following formulas.

NOTE:

SOME NON-ARJAY EQUIPMENT MAY HAVE THE LOAD RESISTANCE BUILT IN.

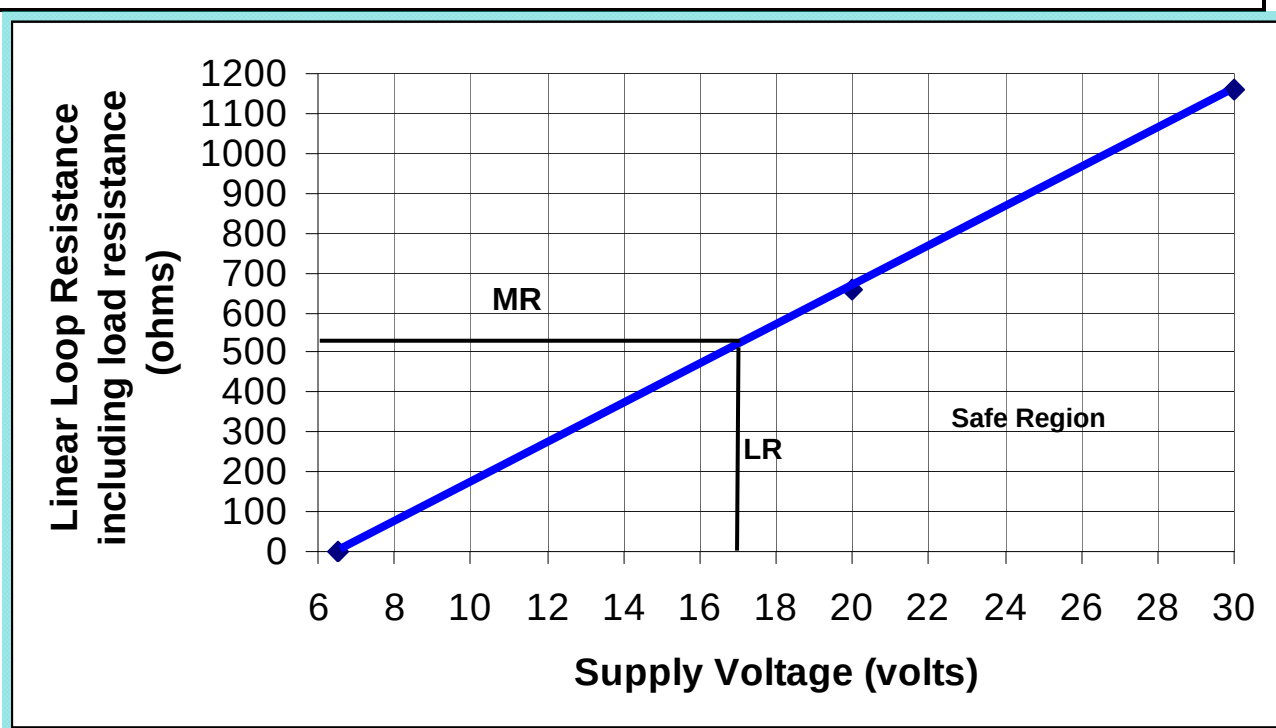


Figure 2.2 - "Cable Selection Graph"

Example: Refer to Figure 2.2 - "Cable Selection Graph"

Known Data: Obtained from measurements, ratings or specifications.

Power Supply	17 VDC
Load Resistance.....	180 ohms
Wire Gauge	20 AWG
Cable Length / 1 Ohm resistance	43.6 ft (13.3 m) typical

Calculations on the Graph: Using the power supply voltage as a reference.

Maximum Resistance	MR
Load Resistance.....	LR

Formula 1: To determine remaining safe loop resistance.

Maximum Resistance	518 Ohms
Load Resistance	<u>- 180 Ohms</u>
Remaining Resistance	= 338 Ohms

Formula 2: To determine maximum safe cable length allowed.

Remaining Resistance	338 Ohms
Cable Length (for 1 Ohm)	<u>x 43.6 feet</u>
Maximum Safe Cable Length	= 14 736 feet

NOTE:

IF MAXIMUM SAFE CABLE LENGTH IS INSUFFICIENT, INCREASE THE POWER SUPPLY VOLTAGE AND/OR REDUCE THE LOAD RESISTANCE.

2.2.1 Transmitter to Monitor Wiring

The transmitter output (-,+) terminals connect to the (SIG,+) terminals on a channel terminal block of the monitor (one transmitter per channel), as shown in Figure 2.3 - "Transmitter to Monitor Wiring Layout". Each transmitter MUST BE CONNECTED TO ITS CORRESPONDING CHANNEL to retain factory calibration of the trip points.

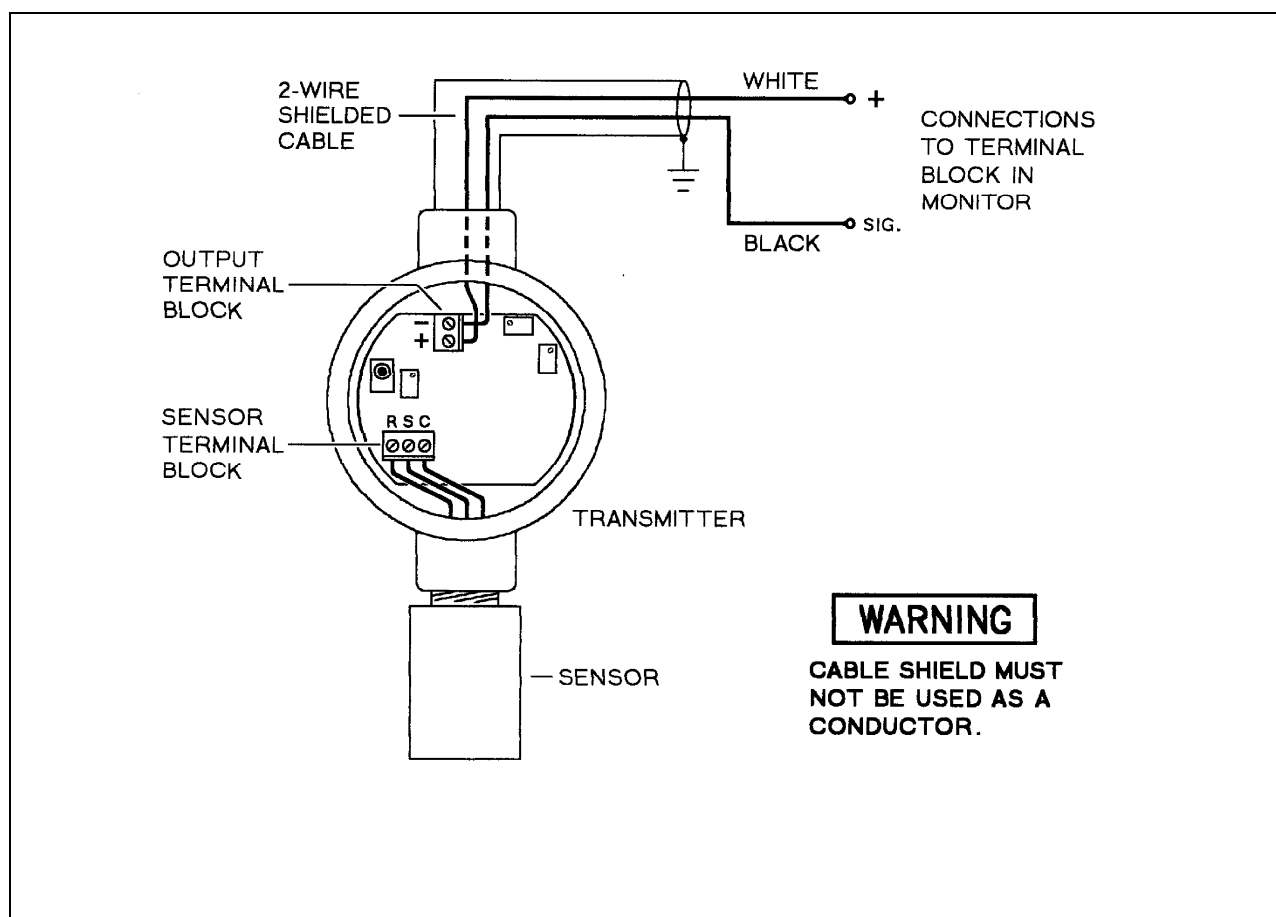


Figure 2.3 - " Transmitter to Monitor Wiring Layout"

2.2.2 Interfacing to computer, datalogger, or non-Arjay monitor

All Arjay sensor/transmitters can be connected to computers or dataloggers through analog-to-digital converters, or to non-Arjay monitors. The transmitter output (-,+) terminals connect to a filtered 12 to 30 VDC power supply, through field wiring. (see Figure 2.4 - "Interfacing to a Computer, Datalogger, or Non-Arjay Monitor")

The signal output from the transmitter is a 4 to 20 milliamp DC current. This signal can be measured or recorded anywhere in the supply loop if required. Alternatively, if a voltage measurement is needed a resistor can be connected (see Figure 2.4 - "Interfacing to a Computer, Datalogger, or Non-Arjay Monitor"), between the transmitter's negative (-) output terminal and the negative or common (-) of the power supply.

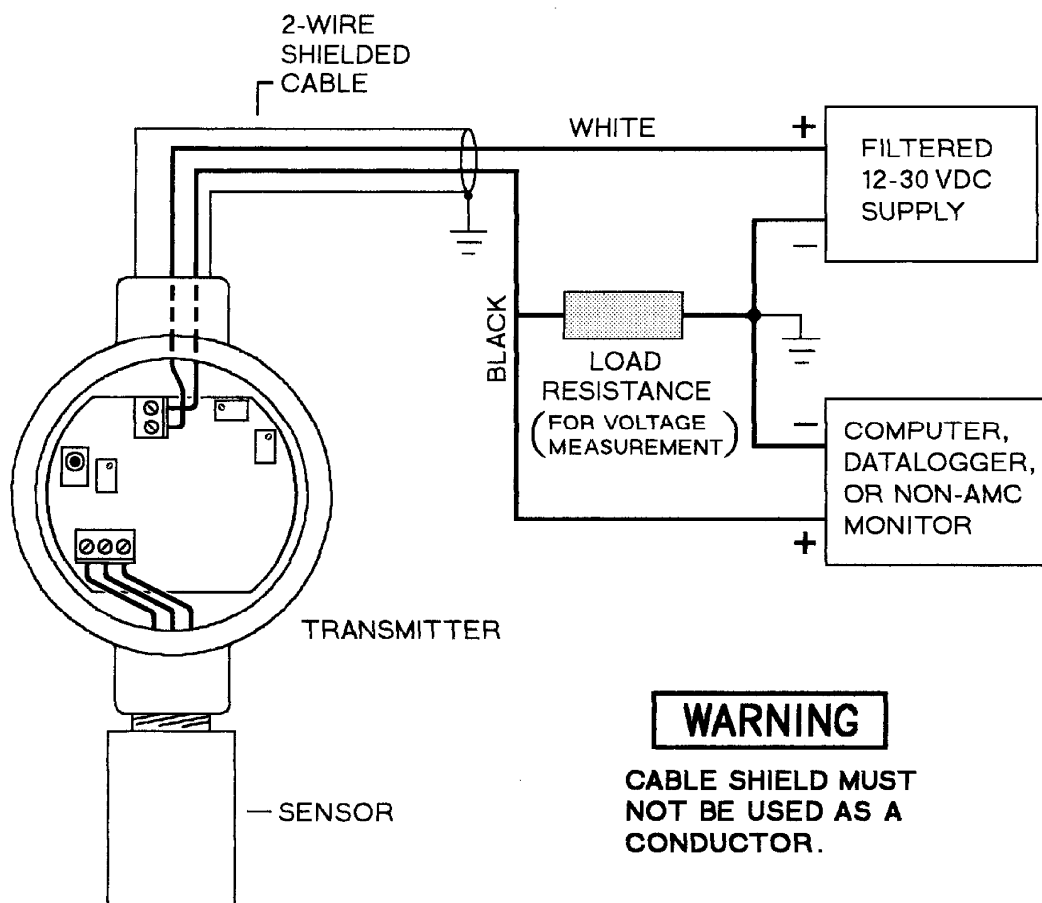


Figure 2.4 - "Interfacing to a Computer, Datalogger, or Non-Arjay Monitor"

3 OPERATION AND CALIBRATION

This section covers instructions for the proper operation and calibration of the HLM-2000-TX units. The operation principles are described in further detail, followed by different types of periodic adjustments that might be required throughout the lifetime of the equipment.

3.1 OPERATION

The HLM-2000-TX sensor/transmitter unit is factory calibrated for the gas listed in Product Information (pg. vi) at the beginning of this manual. The unit should not need recalibration when first installed and powered-up, but a test for correct operation is recommended after a stabilization period of 10 minutes.

In general, after the stabilization period, the transmitter should be sending (in zero gas) a signal of approximately 4 mA to the monitor or controller. However, there are a few situations where a slightly higher or lower than normal signal may be noticed. In many facilities there are residual background gases (including the gas being detected) in the air at all times. These can cause for minor signal variations include extremes in temperature.

In the case of large signal variations (in a clean air environment), check for an installation problem or the possibility of an interference gas being present.

Although the electrochemical sensors are very selective, there are some interference gases which can cause a response from the sensor. These gases are listed on the detailed Specification sheet pertaining to the sensor in use.

3.2 CALIBRATION

The transmitter is equipped with a remote calibration feature allowing one-man calibration at the transmitter location. The transmitter output is measured using a plug-in type "Remote Calibration Lead" (p/n 2900-01) designed to be adaptable to most multi-meters. Zero and Span adjustments are made at the transmitter. Recalibration is necessary when replacing the sensor. Verification of calibration should be done at least once every 6 months for safety reasons and for highly demanding applications, monthly verification is recommended. Factory on-site calibration services, customer training, and/or calibration kits can be provided. Specify the sensor/transmitter type and gas when requesting any of the above.

CAUTION:

ONLY QUALIFIED PERSONNEL SHOULD PERFORM THE ACTUAL CALIBRATION. USERS ARE ADVISED TO CONSULT ARJAY ENGINEERING AS TO THE RECOMMENDED CALIBRATION GAS CONCENTRATION FOR THE APPLICATION, OR OTHER QUESTIONS

For some exotic gases, calibration standards needed for field calibration are not readily available. Arjay Engineering offers the following options:

1. pre-calibrated sensor/transmitters to replace expired units
2. factory installation and calibration of new sensors in returned transmitters
3. replacement sensors supplied with a pre-calibrated electrical output

For all above options, please contact the factory for details.

3.2.1 Equipment required

1. Digital Multi-meter
2. "Remote Calibration Lead" provided with the transmitter
3. "Trimmer Adjustment Tool" or miniature screwdriver
4. Calibration gas(es)

3.2.2 Transmitter calibration/verification set-up procedure

NOTE:

WHEN APPLYING GAS, A FLOW RATE OF 0.5 TO 1 LITRE PER MINUTE IS RECOMMENDED.

The calibration procedure may cause the monitoring equipment to give a false alarm, therefore appropriate precautions should be taken. Instructions on introducing the gas sample are included with the calibration kit or available separately (depending on type of gas or application).

Refer to Figure 3.1- "Calibration/Verification set-up Procedure" for the following procedure.

1. Remove cover from transmitter housing.
2. Plug in standard test leads fully into jacks on multi-meter.
3. Switch-ON multi-meter and select DC volts range to read greater than 1.00 VDC.
4. Apply a Zero gas sample, or with the sensor in clean air, adjust the Zero trimmer for a stabilized reading of 0.00 VDC measured at the test points.
5. Unplug test leads and connect "Remote Calibration Lead" to multi-meter. The BLACK lead to negative or common (-) and the RED lead to positive (+)
6. Insert plug end of "Remote Calibration Lead" fully into CAL jack on the transmitter.
7. Select DC milliamp range on the multi-meter to read greater than 20 mA full scale.
8. If reading is not 4.00 mA, adjust trimmer accordingly.
9. Apply a Span gas sample. The span gas sample need not be the full scale concentration but could be a fraction of this. Since the transmitter output range is 4 to 20 mA, a full scale concentration should register 20 mA after a few moments exposure. A half scale concentration, accordingly, should provide 12 mA and so on.
10. Alternately, the integral digital display readout can be used to make the adjustments in steps 4 and 9 above.

3.2.3 Adjustments

For full recalibration adjustments, follow the Set-Up Procedure steps 1 to 9 inclusive. There are two adjustments to be made for periodic recalibration, Zero and Span.

Zero: When there is no gas present, the transmitter signal output should be 4.00 mA. This is obtained by adjusting the Zero trimmer on the transmitter. Alternately, set the integral display to read "zero" using the zero trimmer with no gas present.

Span: When the sensor is exposed to the calibration gas sample, adjust the span trimmer on the transmitter to set the output current proportional to the gas concentration applied, or the appropriate reading on the display.

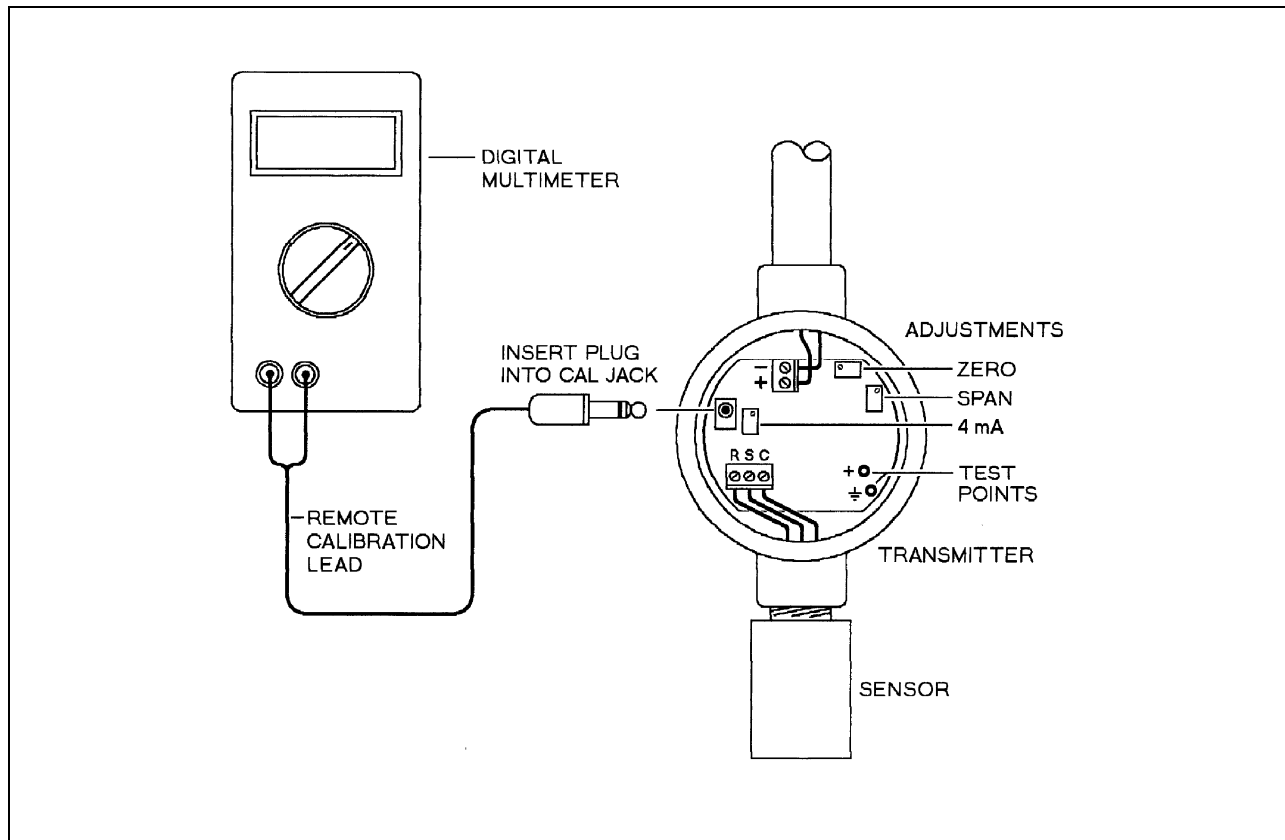


Figure 3.1- "Calibration/Verification set-up Procedure"

4 PREVENTATIVE MAINTENANCE

This section covers topics related to the maintenance of the HLM-2000-TX units. A general description of maintenance to be carried out is followed by a verification of operation and then details about the sensor replacement.

4.1 GENERAL

The sensor/transmitter unit should be brushed or wiped clean once a year or more, of any dust or dirt that settles on it, depending on the accumulation. The unit **SHOULD NOT** be submerged or placed under conditions where water or other liquids would be able to enter the transmitter.

4.2 VERIFICATION OF OPERATION

To verify the operation of the sensor/transmitter unit, make sure that it is still responding to gas. This test should be performed every 2 months, but for more demanding applications, verification should be performed on a weekly basis.

4.3 SENSOR REPLACEMENT

CAUTION:

TURN OFF POWER SUPPLY BEFORE ATTEMPTING THE FOLLOWING

Signal from the sensor will be greatly reduced when its replacement is required. The sensor should be replaced when it no longer responds to the presence of gas or has an unstable zero signal.

When the sensor needs replacing, re-order the Part Number listed in Product Information (pg.vi). When sensors are shipped, some sensor leads may be shorted together. This is done to provide rapid stabilization of the sensor signal after installation. To wire the sensor for correct operation, first separate (cut apart) the shorted leads, if any, then connect the RED lead to the "R" terminal, then BLACK to "S" and the YELLOW to "C" of the sensor terminal block on the transmitter. See Figure 4.1- "Sensor Replacement and Wiring Procedure" for sensor replacement and wiring procedure.

NOTE:

ALLOW 10 MINUTES FOR THE NEW SENSOR TO STABILIZE BEFORE RECALIBRATION, THEN FOLLOW THE INSTRUCTIONS IN CALIBRATION (SECTION 3.2) OF THIS MANUAL.

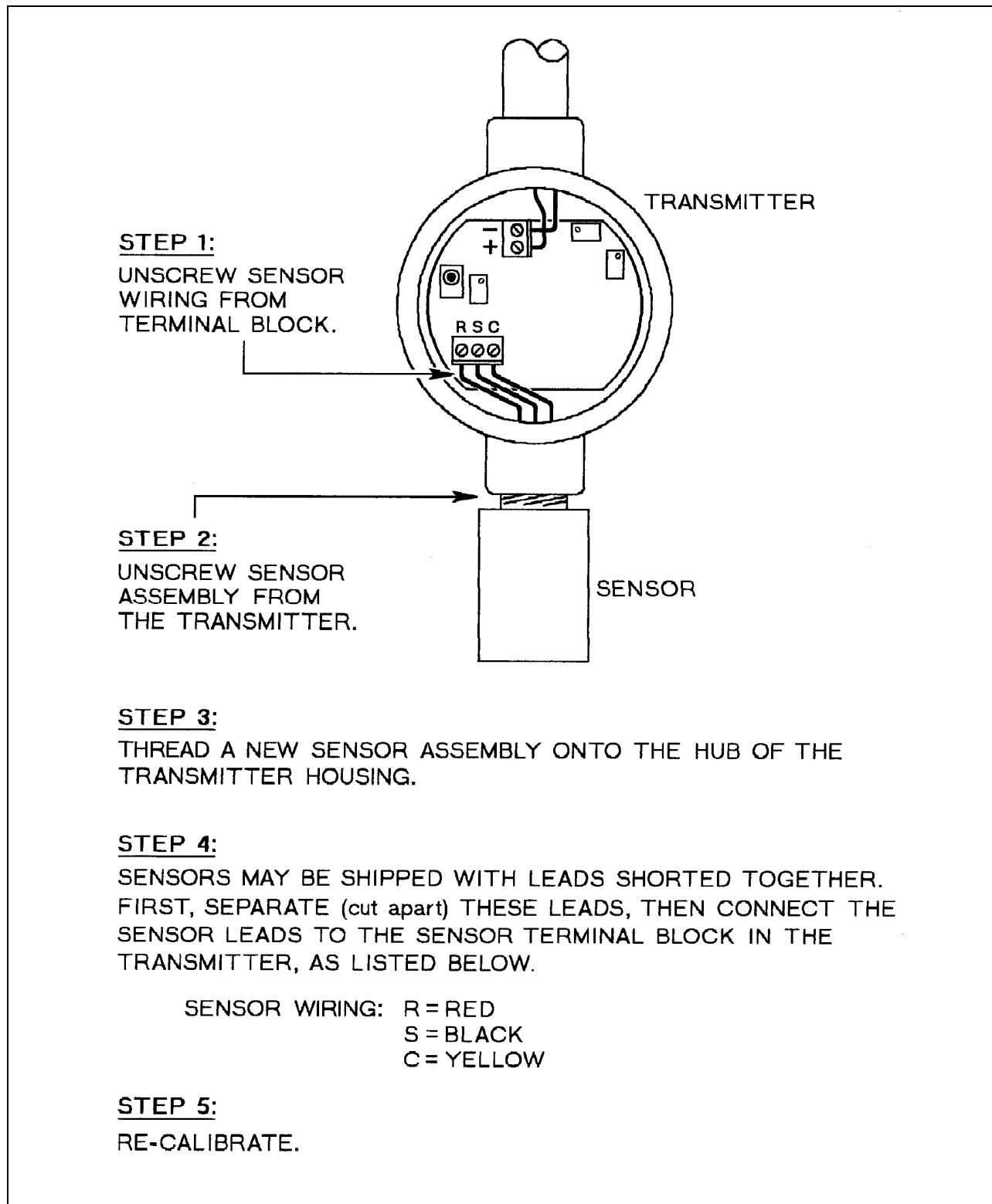


Figure 4.1- "Sensor Replacement and Wiring Procedure"

5 ADDENDUM TO HLM-2000-TX (FOR OXYGEN ONLY)

This HLM-2000-TX (2-wire sensor / transmitter with external electro-chemical sensors) has been modified and the following information replaces the terminal block & sensor wiring of Figures 2-3, 2-4, 3-1 & 4-1.

The sensor / transmitter shows that the three wires changed to two wires for OXYGEN SENSOR ONLY. Terminal block & sensor wiring configuration are as shown below:

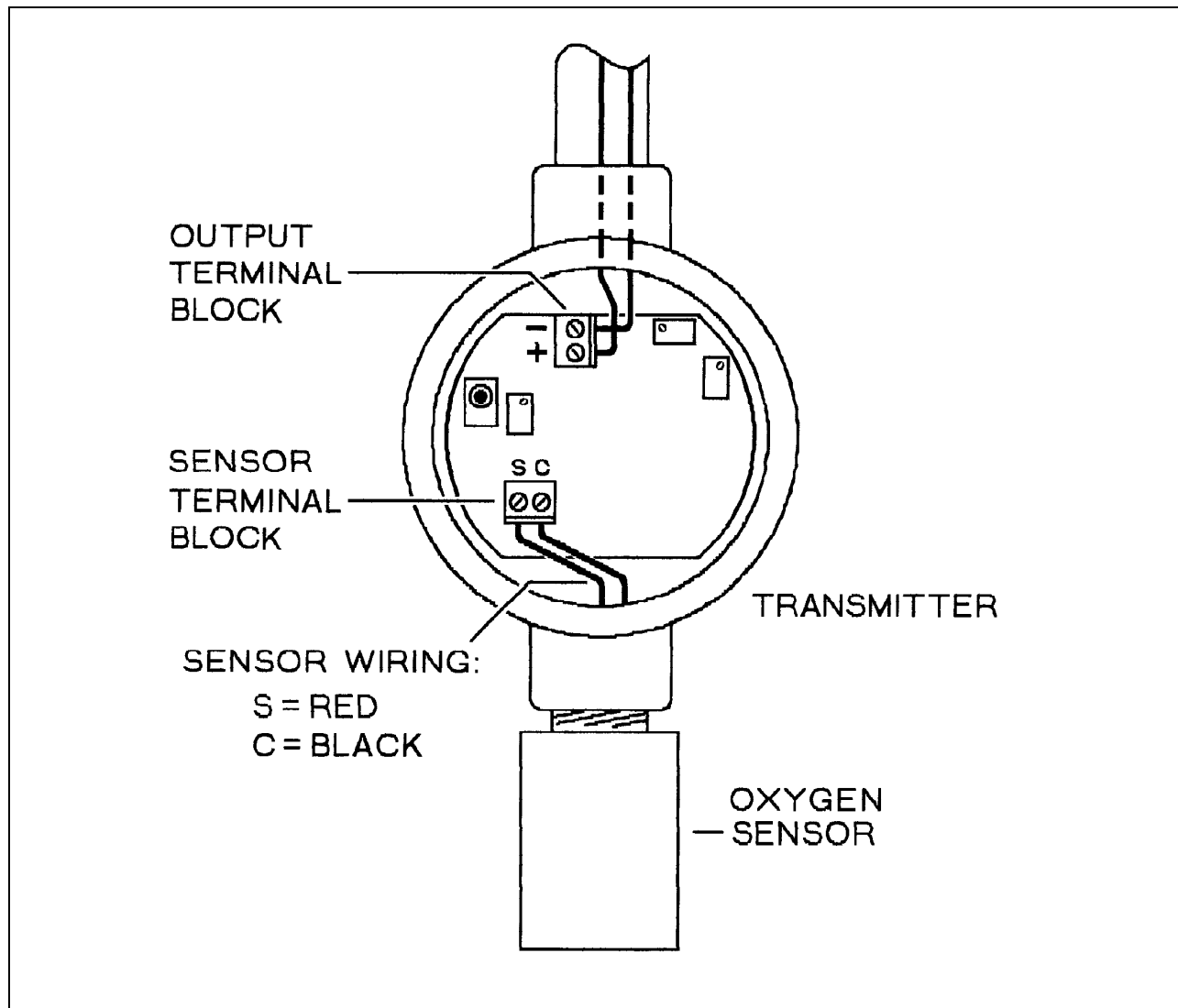


Figure 5.1- "Transmitter with oxygen sensor wiring layout"



CABLE SHIELD MUST NOT
BE USED AS A CONDUCTOR.

1	21/05/09	Updated sensor connection wire colour relation					
REV	DATE	DISCRPTION				CHKD	APPD
REVISIONS							
 ARJAY ENGINEERING LIMITED					PROJECT:		
DWG STATUS DRAWN CHECKED APPROVED		BY V.H.		DATE D M Y 03 06 08		TITLE HLM 2000-TX Field Wiring Connections and Component Detail	
SCALE N.T.S.				REF. DWGS		DWG NO. 20010385	
						SHT. 1	REV. 1



MAINTENANCE AND CALIBRATION

Your **ARJAY / ENMET** gas detector is the state of the art in gas detection, but like any other part of your ventilation system, it requires periodic maintenance and calibration.

There are various sensor technologies that may be used in your Arjay gas monitor; including solid state MOS, Electrochemical, Infrared and Pellister Pair (Hot wire). These have a normal operating life of 3 to 5 years under ambient conditions. You should consider a preventive maintenance schedule whereby you test your system on a periodic basis to ensure its proper calibration and operation.

For solid state (MOS) sensors, we recommend calibration every 3 to 4 months for a typical garage application. For Electrochemical sensors, we recommend calibration every 6 months for a typical garage application. Pellister Pair we recommend every 3 to 4 months and Infrared we recommend every 6 months. For applications that are more sensitive, or where internal policies exist, a higher frequency of calibration may be required. This is a simple procedure which will indicate any problems with your system. A test and calibration kit may be purchased from **ARJAY ENGINEERING** for this purpose. Parts are also readily available from our facility.

MAINTENANCE CONTRACT

Alternatively you may wish to consider a Maintenance Contract with **ARJAY ENGINEERING** whereby one of our service technicians comes to your site and checks out the unit for proper calibration and operation on a regularly scheduled basis. This is done on a flat per annum fee. All parts are extra. Typical target gases are included, however, exotic or specialty gases may have a surcharge. If you wish us to quote a Maintenance Contract fill in the section below and return to our office.

COMPANY:			
ADDRESS:			
CONTACT PERSON:			
PHONE:		FAX:	
EMAIL:			
MODEL AND SERIAL NO. OF GAS DETECTOR:			

Fax to address below or e-mail to arjay@arjayeng.com

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